

REMARKS

The Office Action of June 10, 2004 has been received and carefully reviewed. Claims 1, 33, 34, 43, and 44 have been amended, whereby claims 1-49 are pending in the application. Applicants respectfully request reconsideration and allowance of pending claims 1-49 in view of the above amendment and the following discussion.

I. REJECTION OF CLAIMS 33-35, 43, AND 45 UNDER 35 U.S.C. § 102

Claims 33-35, 43, and 45 were rejected under 35 U.S.C. § 102 as being anticipated by published Japanese patent abstract publication number 06-089690 to Katsuaki (Katsuaki '690). Reconsideration and withdrawal of the rejections under 35 U.S.C. § 102 is respectfully requested for at least the following reasons.

Amended independent claim 33 provides a beam confinement apparatus for inhibiting ion beam blowup in an ion beam transport passageway. Claim 33 has been amended above to recite a ***photoelectron source located substantially along an entire length of a passageway defined by a beamguide***. Amended claim 34 depends from amended claim 33, and further recites that the photoelectron source comprises an inner wall of the beamguide. Amended independent claim 43 provides a method of providing ion beam containment in an ion implantation system, which comprises ***providing a photoelectron source along an ion beam path in substantially an entire length of a passageway defined by a beamguide***. These features are not taught or suggested by Katsuaki '690, which instead appears to teach only a localized beam neutralizer situated proximate a wafer for preventing wafer charging.

Katsuaki '690 illustrates a beam neutralizer positioned near a Si wafer (drawing 2) that generates photoelectrons that are directed in a moving direction to mix with beam ions, where the moving direction of the photoelectrons is limited by the doughnut shape of the bias electrode 1 (abstract, Drawings 1-3). However, with respect to claims 33-35, 43, and 45, ***Katsuaki '690 does not teach a photoelectron source located substantially along the entire length of a passageway defined by a beamguide***. In

discussing claim 34 on page 2, the Office Action refers to the abstract and Figs. 1-3 of Katsuaki '690, and states that this reference discloses that the photoelectron source comprises an inner wall of a beam-guide defining the passageway. However, ***there appears to be no beamguide in Katsuaki '690***, and instead, the electrode 1 appears to be situated downstream in close proximity to the wafer location (Drawing 2 of Katsuaki '690). Thus, claims 33-35, 43, and 45, as amended above, are not anticipated by Katsuaki '690, whereby reconsideration and withdrawal of the rejection thereof is respectfully requested under 35 U.S.C. § 102.

Applicants note that while claim 46 is referred to in the last paragraph on page 2 of the Office Action, this claim does not appear to be specifically indicated as rejected in the Office Action under 35 U.S.C. § 102 (or under 35 U.S.C. § 103). However, this claim depends from amended independent method claim 43, and is therefore also believed to be novel in view of the Katsuaki '690 reference. Thus, to the extent that the Office Action was intended to reject claim 46 under 35 U.S.C. § 102 as being anticipated by Katsuaki '690, Applicants also respectfully request reconsideration and withdrawal of such rejection thereof based on the above amendment and remarks.

II. REJECTIONS UNDER 35 U.S.C. § 103

Claims 1-18 and 21-25 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,541,781 to Benveniste et al. in view of Katsuaki '690. Claims 19, 20, 31, 32, 41, and 42 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,541,781 to Benveniste et al. in view of Katsuaki '690 and further in view of U.S. Patent No. 4,714,860 to Brown et al. Claims 26-30, 38-40, 44, and 47-49 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,541,781 to Benveniste et al. in view of Katsuaki '690 and further in view of the Humphries reference. Reconsideration and withdrawal of these rejections under 35 U.S.C. § 103 is respectfully requested for at least the following reasons.

Applicants also note that claims 36 and 37 are referred to in the Office Action at pages 5 and 6 thereof, although these claims do not appear to be specifically indicated

as rejected in the Office Action under 35 U.S.C. § 102 or § 103. However, these claims depend from amended independent claim 33, and are therefore also believed to be novel and non-obvious in view of the cited art. Thus, to the extent that claims 36 and/or 37 were intended to be specifically rejected, Applicants also respectfully request reconsideration and allowance thereof in view of the above amendment and the remarks herein.

Independent claim 1 is directed to an ion implantation system, comprising an ion source, a beamline assembly, and an end station, wherein the beamline assembly comprises a beamguide defining a passageway through which the ion beam is transported. By the above amendment, ***the photoelectron source*** of claims 1-32 ***extends substantially along an entire length of the passageway between the entrance and exit ends of the beamguide***, and the photon source provides photons to at least a portion of the photoelectron source.

In addition, as discussed above, independent claim 33 has been amended above to recite ***a photoelectron source located substantially along an entire length of a passageway defined by a beamguide***. Furthermore, amended independent method claim 43 recites ***providing a photoelectron source*** along an ion beam path ***in substantially an entire length of a passageway defined by a beamguide***.

Examples of several such beamguides are illustrated in Applicants' drawing figures, including the exemplary beamguide 200 of Figs. 3-12 that extends from an entrance end 210 near an ion source to an exit end 212 near a resolver housing. In certain illustrated embodiments of the application, the photoelectron source is one or more inner walls of the beamguide 200 (e.g., walls 204, 206, 222, 224 in Figs. 4A-7, 10, and 12), and in others, the source is a separate structure (e.g., Figs. 8, 9, and 11).

The provision of the photoelectron source along substantially the entire length of the beamguide passageway and the corresponding generation of photoelectrons *via* the photon and photoelectron sources facilitates distributed prevention of ion beam blowup along the passageway of the beamguide. In this regard, beam blowup is a potential problem along the entire length of a beam transport path or significant portions

thereof, as is further indicated in Benveniste et al. Wafer charging, on the other hand, is a local problem addressed in Katsuaki '690 by the electrode 1 ***near the wafer***, and addressed ***outside the beamguide*** 130 in Benveniste et al. by the plasma shower 145 in the beam neutralizer 124 (Benveniste et al. Fig. 1B).

The apparatus of Katsuaki '690 appears to be a beam neutralizer for neutralizing positive charge that would otherwise accumulate on the wafer in an end station, wherein the neutralizer of Katsuaki '690 appears to provide only a localized effect that is spatially limited to the region near the wafer, as illustrated in Drawing 2 of Katsuaki '690. Thus, Katsuaki '690 does not teach a photoelectron source located substantially along an entire length of a passageway defined by beamguide as claimed. In this regard, the implantation system of Benveniste et al. appears to provide a beam neutralizer 124 (Fig. 1B) for the same purpose as Katsuaki '690, ***which is located proximate to the wafer or wafers being implanted, and which is located downstream of the exit end of the beamguide*** 130 between the beamguide 130 and the end station 116. Thus, neither Katsuaki '690 nor Benveniste et al. teach a photoelectron source with a photon source providing photons thereto in a beamguide, whereby the combination of Katsuaki '690 with Benveniste et al. fail to teach each and every element of the claimed inventions. In addition, one of ordinary skill in the art would not be motivated to modify the cited art in accordance with the present invention, as discussed hereinafter.

The abstract and drawings of Katsuaki '690 specifically indicate that the bias electrode 1 limits the moving direction of the photoelectrons, by which the neutralizer has a localized effect at the wafer. In addition, the deformed doughnut shape of the electrode 1 also appears to inhibit the accumulation of dirt on an emission plate, which is one of the stated problems to be solved by the Katsuaki '690 apparatus. Thus, a person of ordinary skill in the art, upon considering the Katsuaki '690 reference as a whole, would conclude that the Katsuaki '690 neutralizer has a very localized neutralizing effect resulting from the electrode shape and design, and further that this electrode shape and the corresponding localized effect is necessary to achieve the

goals of Katsuaki '690. Consequently, the person of ordinary skill in the art would not seek to provide the neutralizer of Katsuaki '690 in the beamguide 130 of Benveniste et al. for ion beam containment. Rather, the structure of Katsuaki '690 appears unsuited for such use, absent modification that would render it unsuitable for its intended purpose of localized beam neutralization near the wafer.

In order to establish a *prima facie* case of obviousness, there must be some suggestion or motivation in the references themselves, in the nature of the problem to be solved, or in the knowledge generally available to one skilled in the art to modify the reference or to combine references. MPEP § 2143.01, citing to In re Kotzab, 217 F.3d 1365, 55 USPQ2d 1313 (Fed. Cir. 2000); In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). The mere fact that references *can* be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. MPEP § 2143.01, citing In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990); In re Fritch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992). Motivation for combining references or modifying references may come from explicit statements in the art, implicit teachings therein, the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved. Moreover, the showing of such suggestion or motivation must be clear and particular. In re Lee, 277 F.3d 1338, 1343, 61 USPQ2d 1430 (Fed. Cir. 2002); In re Dembiczak, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999). In addition, there must be a reasonable expectation of success in making the proposed modification or combination. MPEP § 2143.02. Furthermore, where a proposed modification or combination or the prior art would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. MPEP § 2143.01 citing to In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Applicants submit that no suggestion, motivation, or reasonable expectation of success exists for the proposed combination of the neutralizer Katsuaki '690 with the implantation system of Benveniste et al. (or other ion implantation system beamguides), with or without the secondary references Brown et al. and Humphries.

In particular, placement of the Katsuaki '690 neutralizer within the passageway 137 of the beamguide 130 of Benveniste et al. would not provide distributed beam containment substantially along the entire length of the passageway, but rather would likely provide only localized neutralization, due to the electrode structure (electrode 1) of Katsuaki '690 (Katsuaki abstract and drawings). Applicants submit that a person of ordinary skill in the art would not be motivated to make this combination, since **Katsuaki '690 explicitly indicates that the electrode 1 *limits the moving direction of the electrons***. Furthermore, introduction of a number of such neutralizers of Katsuaki '690 within substantially all of the beamguide 130 of Benveniste et al. would be viewed as likely to disturb the operation of the beam containment apparatus of Benveniste et al. (e.g., multi-cusped magnetic fields interacting with RF or microwave power) and/or with the mass separation operation of the mass analyzer in a portion of the beamguide 130.

Modification to the beamguide of Benveniste et al. to include one or more of the Katsuaki '690 neutralizers would likely interfere with the interaction of RF or microwave energy with multi-cusped magnetic fields to provide the beam containment of Benveniste et al. (e.g., Benveniste et al. abstract, Figs. 7A, 7B, col. 2, lines 25-29, etc.) again, due to the intrusive shape of the electrode 1 of Katsuaki '690. In this regard, a person of ordinary skill in the art would not seek to obstruct the beam containment apparatus within the passageway 139 of Benveniste et al.

Moreover, placement of the electrode 1 of Katsuaki '690 in the mass analyzer area of the Benveniste et al. beamguide 130 (e.g., Applicants' claims 14, 15, 23, and 24) would appear to interfere with mass separation operation. Furthermore, Katsuaki '690 appear to teach away from modification of the structure of the electrode 1, wherein the shape of the electrode 1 appears necessary for controlling or limiting the movement direction of the generated ions and for inhibiting accumulation of dirt on the emission material 2, as discussed in Katsuaki '690. Thus, the nature of the problems being solved by the neutralizer of Katsuaki '690 and the structural manner in which Katsuaki addresses these problems would appear to teach away from its inclusion in a

beamguide (e.g., and particularly a mass analyzer portion thereof) in Benveniste et al. or any other ion implantation system.

Therefore, a person of ordinary skill in the art would likely avoid attempts at combining Benveniste et al. with Katsuaki '690 or making modifications thereto as proposed in the Office Action, since no motivation or suggestion would be found for such combination/modification, and since such combination/modification would appear unlikely to succeed. In addition, the secondary references to Humphries and Brown et al. do not appear to provide suggestion, motivation, or reasonable expectation of success or otherwise remedy the deficiencies of the proposed combination of Benveniste et al. with Katsuaki '690. Accordingly, the pending claims 1-49 are believed to be patentably distinct from the proposed combinations of Benveniste et al. with Katsuaki '690, Brown et al., and the Humphries reference, whereby reconsideration and allowance thereof is respectfully requested under 35 U.S.C. § 103.

III. CONCLUSION

For at least the above reasons, the claims currently pending in the application are believed to be in condition for allowance and reconsideration thereof is requested.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-1733, EATNP151US.

Respectfully submitted,
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Date: June 24, 2004



Christine Gillroy